Corrosion Inhibition of Carbon Steel in the presence of N,N'-bis(1-phenylethanol)diaminobutane in HCl

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Carbon steel is an important metal for structure and machines and is easier to be corroded in acidic medium. In this study, N,N'-bis(1-phenylethanol)diaminobutane (BPDAB) was synthesized and used as the corrosion inhibitor for carbon steel in 1 mol/L HCl solution. The inhibition performance of BPDAB was investigated by weigh loss test and electrochemical methods. The results of this study showed that the corrosion rate of carbon steel decreased by adding inhibitor to the acid solution, and the inhibition efficiency reached the maximum value of 97.6% with 0.3 mmol/L of BPDAB by electrochemical impedance spectroscopy. The Langmuir adsorption isotherm was used to fit the experimental data, and the results showed that, the spontaneous adsorption of inhibitor molecules on the carbon steel surface, and the adsorption mechanism follows a typical of chemisorption process via the formation of a coordinate bond.

Keywords: Corrosion inhibitor; Electrochemical methods; Carbon steel; Diaminobutane; Quantum chemical calculation

FULL TEXT

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